

### REMARKS

Reconsideration and allowance of the application are respectfully requested in light of the above amendments and the following remarks.

Replacement drawings for Figs. 1, 2, 5, 7, 10, 13, 14, 16, 18, 21, 23-25, 26B, 26C, and 27 and new Fig. 31 are submitted herewith to overcome the objections to the drawings.

The specification has been amended to overcome the applied objections. No new matter is believed to be introduced by the amendments of the specification.

Claims 1, 16, and 45-49 have been canceled in favor of new claims 57-63, respectively. Claims 2-15, 17-44, and 50-56 have been amended to overcome the indefiniteness rejections, to correspond to their new base claims, to place all elements in clear non-means-plus-function format, and for clarity. Support for the subject matter of the amended claims is provided at least in the original claims and Figs. 2-4 and their supporting descriptions in the specification.

Claims 1-5, 8-14, 16-28, 30-37, and 45-55 were rejected, under 35 USC §102(b), as being anticipated by Sato (et al. (JP 2000-022656)). Claims 6 and 7 were rejected, under 35 USC §103(a), as being unpatentable over Sato in view of O'Sullivan et al. (US 5,487,069). Claim 29 was rejected, under 35 USC §103(a),

as being unpatentable over Sato in view of Garcia et al. (US 6,785,258). Claims 38, 39, and 41 were rejected, under 35 USC §103(a), as being unpatentable over Sato in view of Sumiya et al. (US 5,319,672). Claims 40, 42, and 44 were rejected, under 35 USC §103(a), as being unpatentable over Sato in view of Sumiya and Kaiser et al. (US 6,188,717). Claim 43 was rejected, under 35 USC §103(a), as being unpatentable over Sato in view of Kaiser. To the extent the rejections may be deemed applicable to the amended claims, the Applicants respectfully traverse based on the points set forth below.

Independent claim 58 defines a multi-carrier communication apparatus that maps a first set of symbol patterns, which are expressed by a plurality of subcarriers, to a larger set of symbol patterns. For each symbol pattern within the larger set, at least one of the subcarriers has an in-phase or quadrature phase component set to an amplitude of "0."

For example, with respect to the non-limiting subject matter illustrated in Applicants' Fig. 3, suppose a first set of symbol patterns has sixteen patterns, PN1-PN16, that may be expressed by four subcarriers, f1-f4 (i.e., the informational content of all four subcarriers is required to represent one of the sixteen symbol patterns at each instant). If the amplitude values that may be assigned to the four carriers are increased from the two

values -1 and +1 to the three values -1, 0, and +1, then twice as many, or thirty-two, patterns may be expressed by the four subcarriers, as illustrated in Fig. 4. Thus, each pattern of the first set may be mapped into a distinctive pattern of a second set such that each pattern of the second set has an amplitude value of "0" assigned to one of the four subcarriers, as illustrated in Fig. 5. As a result of such mapping, the peak voltage of the combined carriers may be reduced so as not to saturate the high-power amplifier of the transmitter. In other words, the mapping process may eliminate the situations in which all four subcarriers transmit the same amplitude value and phase.

By contrast to the claimed subject matter, Sato discloses that one or more subcarriers of an OFDM signal may employ different signal-space arrangements (i.e., one or more subcarrier signal-space arrangements are offset in phase from the signal-space arrangement(s) of one or more other subcarriers) (see Sato ¶ [0041]). Sato's Figs. 3 and 6 provide examples of such phase-offset signal-space arrangements. For example, Sato illustrates two phase-offset signal-space arrangements, a and d, in Fig. 3A, and illustrates in Fig. 3B how these two signal-space arrangements may be used simultaneously by carriers f1-f3 of a multicarrier signal. More specifically, Sato illustrates that

signal-space arrangement a is assigned to subcarrier f1 and signal-space arrangement d is assigned to subcarriers f2 and f3.

In Fig. 6, Sato illustrates four phase-offset signal-space arrangements, C0-C3, that are assigned to subcarriers f1-f5. In this example, signal-space arrangement C0 is assigned to subcarrier f4, signal-space arrangement C1 is assigned to subcarriers f1 and f5, signal-space arrangement C2 is assigned to subcarrier f2, and signal-space arrangement C3 is assigned to subcarrier f3.

In summary, Sato discloses assigning one or more phase-offset signal-space arrangements to one or more subcarriers of a multicarrier signal so that less than all of the subcarriers use the same signal-space arrangement. Sato does not disclose the claimed features of: (1) mapping a first set of symbol patterns, which are expressed by a plurality of subcarriers, to a larger set of symbol patterns and (2) assigning, for each symbol pattern within the larger set, an amplitude value of "0" to an in-phase or quadrature phase component value of at least one of the subcarriers. And O'Sullivan, Garcia, Sumiya, and Kaiser are not cited for supplementing the teachings of Sato in this regard.

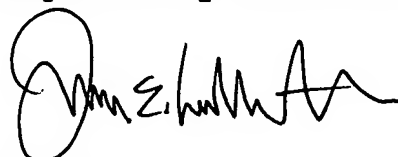
Accordingly, the Applicants submit that the applied references, considered individually or in combination, do not anticipate or render obvious the subject matter defined by claim

58. Independent claims 57 and 59-63 similarly recite the above-described feature distinguishing apparatus claim 57 from the applied references, although claim 63 does so with respect to a method and claims 57, 59, and 60 do so with respect to the inverse of the mapping operation (i.e., demapping) defined in claim 57. Therefore, allowance of claims 57-63 and all claims dependent therefrom is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,



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Date: April 30, 2007  
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IN THE DRAWINGS

Proposed changes to Figs. 1, 2, 5, 7, 10, 13, 14, 16, 18, 21, 23-25, 26B, 26C, and 27 and a new Fig. 31 are submitted herewith, with a Submission of Proposed Drawing Amendments.